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Q-Test
User & Operator Manual

Q-Test
Quick and simple in-field gas test and calibration solution

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M070001/ENG
Issue 3 Jan 2015

CROWCON
Detecting Gas Saving Lives

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Prologue

General

Thank you for purchasing the Q-Test. At Crowcon we recognise the need for quick and simple gas test solutions which are suitable for the challenges of on-site and off-site use.

Q-Test provides a quick and simple in-field gas test and calibration solution. Providing off-site testing for remote locations where power is not always available or practical. Simple to use and easy to repeat, Q-Test reduces set-up, training requirements and space needed.

Flexibility

Q-Test manages speedy and smart bumps as well as calibration. Q-Test can also be easily mounted via din rail mounts on a wall or inside a vehicle to give a gas test solution for any application.
The charging option also gives a permanent home to detectors mounted in vehicles and is easily powered via a standard in-vehicle power socket or multiregional power supply.

Remote Workers

When in the field, Q-Test provides confined space workers with repeatable gas testing solutions that maintain detector integrity and safety. When working in conjunction with +ve Safety™ fleet managers can quickly and easily tell when site requirements have not been adhered to.

Economic

Repeatable test solutions that, through recommended gas use instructions, can offer over 200 speedy bumps from a 34l cylinder and over 330 speedy bumps from a 56l cylinder.

Safety Information

- Read and understand all instructions in the operation section of this manual prior to use.
- Before use ensure that the equipment is in good condition, the enclosure is intact has not been damaged in any way.
- If there is any damage to the equipment or it is not working properly, do not use, read the troubleshooting guide (see *page 27*) and/or contact your local Crowcon office or agent for repair/replacement.
- Observe all warnings and instructions marked on the unit and within this manual.
- Observe site health and safety procedures for gases being monitored and evacuation procedures.
- Understand the Gas-Pro screen display and alarm warnings prior to use (see Gas-Pro User & Operator Manual).
- Ensure maintenance, service and calibration is carried out in accordance with the procedures in the manual and only by trained personnel.
- Gas-Pro is a hazardous area certified gas detector and as such must be operated and maintained in strict accordance with its instructions, warnings and label information included in the Gas-Pro manual.
- Use only Crowcon supplied Gas-Pro mulitregion plug or vehicle charging adaptor. Not suitable for use with other mulitregion plugs as these may cause damage to the unit.

Unpacking

Remove the Q-Test from the packaging. The standard accessories are under the supporting trays. The following items will be included as standard:

Box contents

- Q-Test
- CD Manual

Optional items in the box

- Regulators
- Gas-Pro Mulitregion plug
- Vehicle charging adaptor

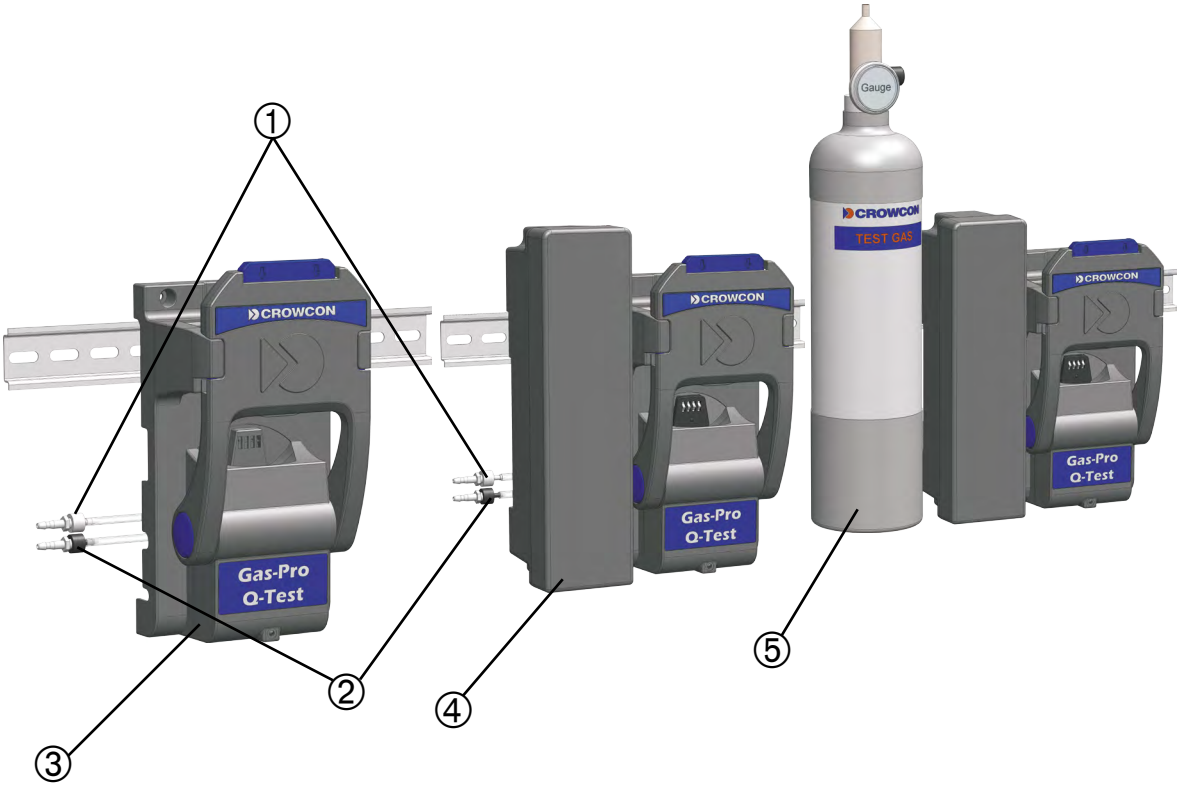
The box label details the contents.

1. Set-up

1.1 Mounting

The gas inlet pipe ① and gas exhaust pipe ② are long enough to allow placement to the left or the right of the Q-Test ③, powered Q-Test ④ or powered Q-Test with cylinder holder ⑤ but should be located prior to mounting.

Figure 1: Inlet/outlet location



The Q-Test can be mounted on a standard DIN rail type EN 50022 ① or screwed to a suitable flat surface through the 3 holes ② in the module's main body (see below).

The recommended length of DIN rail if a Q-Test is to be mounted on its own, is 150mm.

If the Q-Test is to be used in conjunction with a cylinder holder, the recommend length of DIN rail required is 250mm.

The recommended length of DIN rail if a Powered Q-Test is to be mounted on its own, is 275mm (this is supplied with the powered Q-Test).

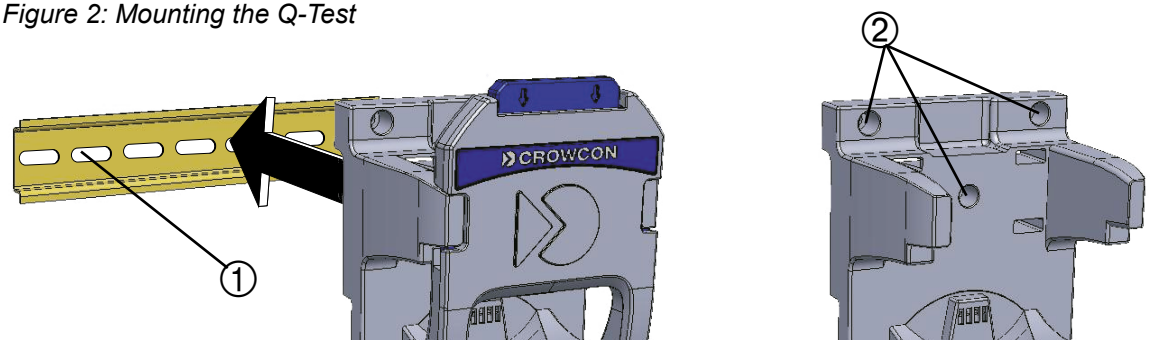
If the Powered Q-Test is to be used in conjunction with a cylinder holder, the recommend length of DIN rail required is 350mm.

Mount the DIN rail to the wall (flat side against the wall), allowing space on at least one side to slide the Q-Test on.

The cylinder holder is available to mount on the DIN rail or direct to the wall.

Ensure that when the Q-Test is mounted, the Gas-Pro screen and operator button will be accessible (see *Figure 7* on *page 12*).

Figure 2: Mounting the Q-Test

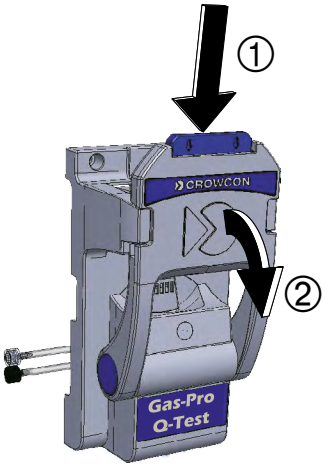


1.2 Prior to use

1.2.1 Opening the Q-Test

Press the release button ① and lower the door ② as shown below:

Figure 3: Opening the Q-Test

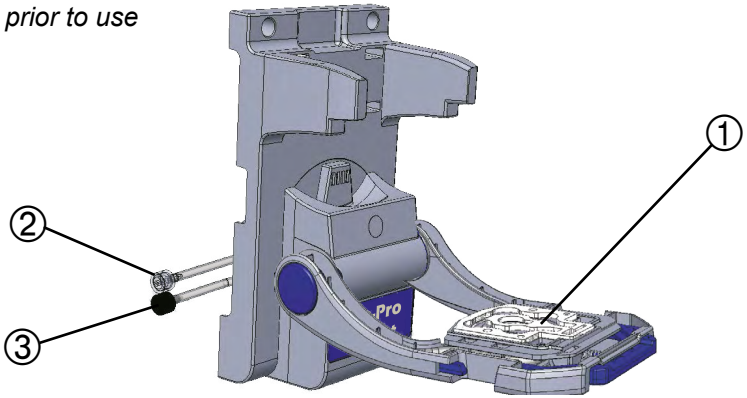


There are two open levels, if left to fall the door will open to 45º. The door can be fully opened by pulling the door down gently.

1.2.2 Inspection

Before use, the Q-Test should always be checked for any signs of physical damage, paying special attention to the flow gasket ①, the gas inlet pipe ② and gas exhaust pipe ③. Ensure there is no damage to the gasket; this could result in poor gas flow.

Figure 4: Inspection prior to use



1.3 Inlet/exhaust connections

The gas cylinder is connected to the gas inlet pipe ① and the gas exhaust pipe ② should be connected to a suitable length of pipe that vents to outside air. These pipes are long enough to allow placement to the left or the right of Q-Test.

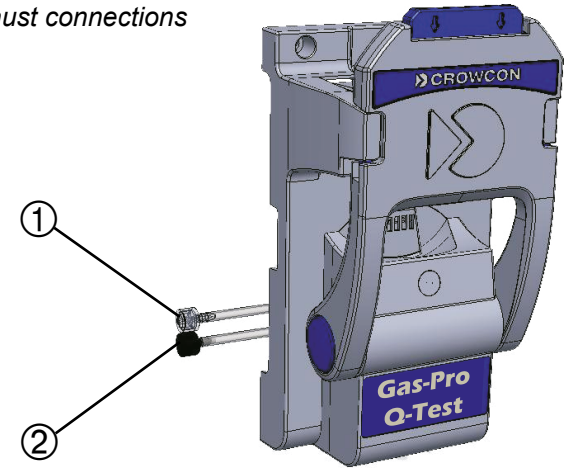
1.3.1 Inlet Connections

For non reactive gases Crowcon recommend the use of Tygothane or Tygon 3603 pipe. If this pipe is used, the maximum recommended tube length from the regulator to Q test inlet is 30m.

For use with reactive gases Crowcon recommends the use of Tygothane pipe (AC0301). If this pipe is used the maximum recommended tube length form the regulator to Q test inlet is 1m.

When using reactive gases, for correct operation, all pipe work and regulators should be purged with the respective reactive gas.

Figure 5: Inlet/exhaust connections



1.3.2 Regulators

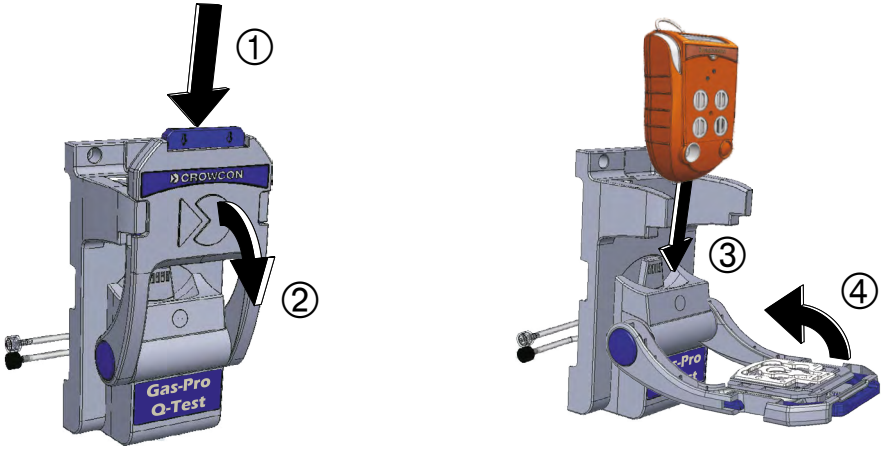
Q-Test can be used with 0.5 litres per min or 1 litre per min regulators. Fixed flow or trigger regulators are required as the user is responsible for opening the gas flow at the correct time (when prompted by the Gas-Pro). See accessories section for details.

2. Operation

2.1 Inserting the Gas-Pro

Turn the Gas-Pro on, wait for it to finish the start up process and then insert the Gas-Pro into the Q-test as shown below:

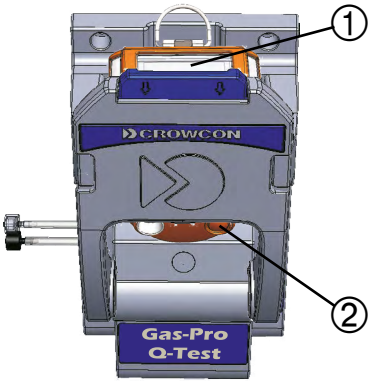
Figure 6: Inserting the Gas-Pro



2.2 Gas-Pro control

When the Gas-Pro is inserted into the Q-Test, you will need to see the display screen ① and have access to the operator button ② (see below).

Figure 7: Gas-Pro controls



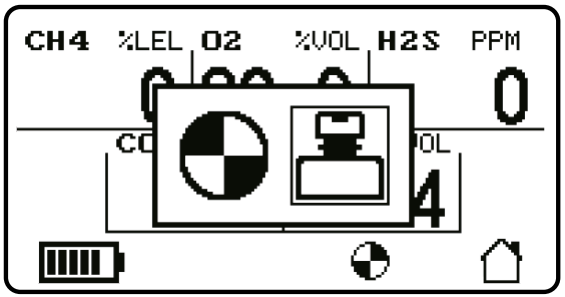
2.3 Bump test

If the Gas-Pro is configured for Bump/Pump functionality, then by placing the Gas-Pro in a Q-Test module, the Bump/Pump screen will be displayed (see *Figure 8* below).

If the Gas-Pro is a non pumped unit and not configured for bump test the 'sensors blocked by flow plate' warning icon will be shown when inserted into the Q-Test. The Gas-Pro will need to be configured for bump to operate correctly in the Q-Test.

If the Gas-Pro is a pumped unit and not configured for bump test the pump will immediately start. The Gas-Pro will need to be configured for bump to operate correctly in the Q-Test.

Figure 8: Bump/Pump screen



Click the operator button to highlight for Bump testing and then double click it to select the Bump test.

According to the Gas-Pro configuration, the user may be asked to choose which group of gases to bump and either a Speedy bump or Smart bump test will be performed (see *page 15*).

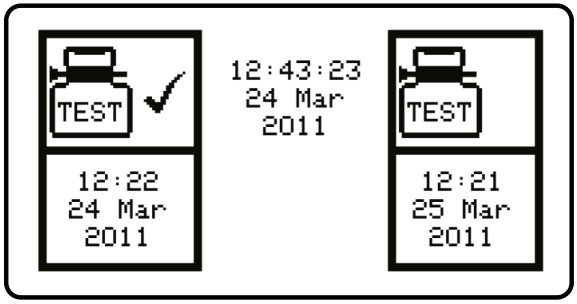
2.3.1 Bump Test Functionality

As part of the bump testing functionality Gas-Pro offers the ability to allocate gas sensors fitted to the Gas-Pro into different 'bump test groups'. These groups apply to both the speedy and smart bump functionality.

The groups available are 'Daily' and 'Intermittent', these can be configured via Portables-Pro. This allows a different gas test regime to be applied for different sensors inline with site/company procedures. The information below explains this in greater detail:

If the sensors are grouped into the 'Intermittent' group with, for example, a 90 day interval (this interval is configurable in Portables-Pro), Gas-Pro will inform the user a bump test is due on the 90th day of use. This is indicated by a gas test due warning on the Gas-Pro screen during start up.

Figure 9: Gas test due screen



Gas-Pro will not inform the user of a need for a gas test until the interval period from the last successful bump has expired. However on applying a magnetised flow plate, or placing Gas-Pro into the Q-Test, the user will be given the option to complete a gas test (or proceed to pumped operation).

If the sensors are grouped into the 'Daily' group, the Gas-Pro will inform the user a bump test is due at the start of each working day (actually every 24 hours). This is indicated by a gas test due warning on the Gas-Pro screen during start up.

If Gas-Pro is turned off and on again within 24 hours of the gas test, the Gas-Pro will not inform the user of a need for a bump test. However on applying a magnetised flow plate, or placing Gas-Pro into the Q-Test the user will be given the option to complete a gas test (or proceed to pumped operation).

2.3.2 Speedy bump

A speedy bump tests the Gas-Pro to first alarm level.

Gas is presented across/over the sensor for a designated time (dependent on sensor gas type) during which alarm level one should be activated.

This is deemed a pass if the detector goes into alarm and the detector is functioning (sounder, LED's and vibrator, verified by the user).

It is a fail if the detector does not go into alarm.

2.3.2.1 Procedure

- Place the Gas-Pro in the Q-Test module.
- Click the operator button to highlight for Bump testing and then double click it to select the Bump test.
- The screen will show 'Gas on'.
- Attach the gas bottle to the inlet pipe and turn it on.
- After a time (depicted by a time bar at the base of the display), the display will show if the gas(es) being tested have passed ✓ or failed ✗. Gases not being tested will display [*]. The test will end before the preset time if all gases being tested pass.

2.3.3 Smart bump

A smart bump tests that the Gas-Pro responds correctly to a specified level of test gas.

Gas is passed over/across the sensors and a predicted response is expected within a time window dependant on the sensor response time.

The test is passed if the gas level indicated by the detector is within pre-specified limits within this time window (the parameters of this test are configurable via Portables-Pro).

2.3.3.1 Procedure

- Place the Gas-Pro in the Q-Test module.
- Click the operator button to highlight for Bump testing and then double click it to select the Bump test.
- The screen will show 'Gas on'.
- Attach the gas bottle and turn it on.
- After a time (depicted by a time bar at the base of the display), the display will show if the gas(es) being tested have passed ✓ or failed ✗. Gases not being tested will display [*].

2.3.4 Calibration after bump fail

If any channel fails speedy bump or smart bump then Gas-Pro can be configured (via Portables-Pro) to perform a 'calibration after bump fail' immediately after the test failure.

As this test immediately follows a speedy or smart bump, if 'calibration after bump fail' is configured the speedy or smart bump test will need to undertaken with calibration quality gas.

Ensure the gas applied matches the configuration settings in the Gas-Pro or the test will fail. This can be done via Portables-Pro.

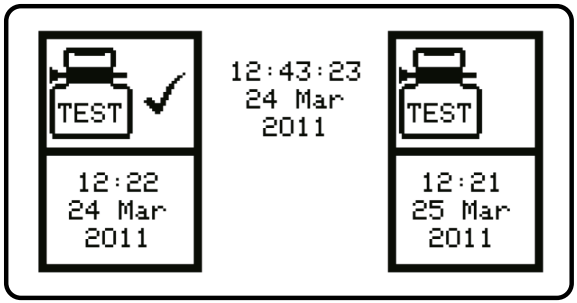
Should a flammable sensor be fitted, check the label for the original calibration target gas.

2.3.4.1 Procedure

Calibration should only be performed with appropriately accurate gas.

- If calibration is intended the instrument should have been zeroed manually within 15 minutes prior to the calibration attempt.
- Following a bump test failure, leave the instrument in the Q-test module and the gas on.
- Wait for the calibration result screen indicated by the ✓ or ✗.

Figure 10: Gas test due screen



- The Gas-Pro then returns to normal operation.

During this process the new calibration values are stored to the instrument memory and the calibration dates are advanced by the configured interval – commonly 1 month as the Gas-Pro has not been through a formal service/calibration routine (dependant upon region/setting).

If the gas test calibration fails this may be indicative of a more serious sensor issue, including the need to replace sensors. The instrument should then be serviced.

2.4 New sensor calibration/service

Servicing or the fitment of a new sensor can only be undertaken by a suitably trained technician using the PC software and the appropriate gases.

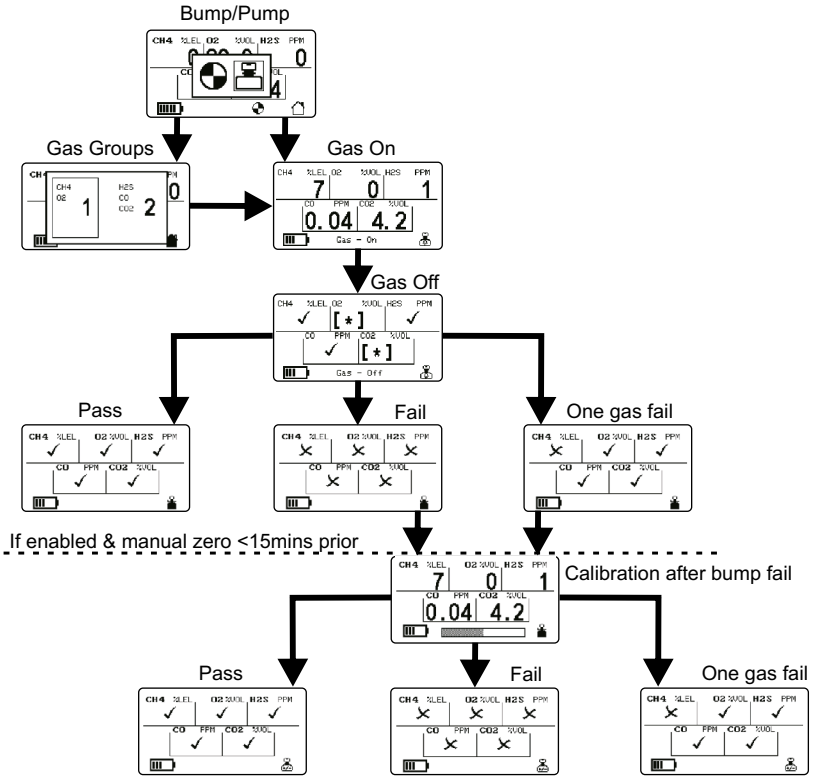
In addition calibration should be performed as required by local or organisational regulations. In the absence of suitable evidence, such as a field assessment by a competent person, Crowcon recommend regular service and calibration every 6 months.

2.5 Gas Test Screen Flow

The following sequence of screen shots should be viewed with reference to the sections on ‘Speedy Bump’, ‘Smart Bump’ & ‘Calibration after bump fail‘.

The screen shots show the general flow of the gas test functionality dependant upon the actual test and the decisions made.

Figure 11: Gas test screen flow



2.6 Q-Test Gas Suitability

The following gases are suitable for use with the Q-Test:

- Oxygen
- Carbon Monoxide
- Hydrogen Sulphide
- Carbon Dioxide
- Sulphur Dioxide (Reactive gas)
- Methane
- Butane
- Propane
- Pentane
- Acetylene
- Ethylene
- Ammonia (Reactive gas)
- Nitrogen Dioxide
- Nitric Oxide
- Ozone (Reactive gas)
- Chlorine (Reactive gas)
- Chlorine Dioxide (Reactive gas)

2.7 Gas Testing Requirements/Recommendations

When using reactive gases all pipe work and regulators should be purged with the respective reactive gas.

Crowcon recommend using a typical flow rate of the test of 0.5 litres per minute.

When using chlorine and chlorine dioxide as the test gas the typical flow rate should be increased to 1 litre per minute.

Chlorine dioxide gas testing (or calibration) must only be carried out using a chlorine dioxide generator. Crowcon recommend Advanced Calibration Designs, inc. Gas Generator, model: CAL2000 (P/N: 750-0603-AT), using the Chlorine Dioxide Cell (P/N: 510-2060-00). Refer to generator instructions for use.

Ozone gas testing (or calibration) must only be carried out using an ozone generator. Crowcon recommend Analytical Technology, inc. Ozone Generator, Model: A23-14. Refer to generator instructions for use.

2.8 Test Gas Requirements

For each type of gas test that can be undertaken by Q-Test; speedy bump; smart bump and calibration after bump fail, Crowcon recommend the following gas levels.

Care should be taken to ensure Gas-Pro is configured correctly such that the gas levels applied are suitable for the test to be undertaken, the configuration can be verified via Portables Pro. If Gas-Pro is not configured correctly for the gas to be applied, then the test will not be successful.

2.8.1 Speedy Bump Recommended Gas Levels

Table 1 shows the recommended minimum and maximum concentration of gas suitable for a Gas-Pro configured to undertake a speedy bump test when inserted into a Q-Test.

Table 1

Gas	Gas Name	Recommended Minimum Concentration	Recommended Maximum Concentration (see note)
O_2	Oxygen	≥ configured alarm level 1 threshold	≤ 22% VOL
CO	Carbon Monoxide	≥ configured alarm level 1 threshold	≤ 400ppm
H_2S	Hydrogen Sulphide	≥ configured alarm level 1 threshold	≤ 85ppm
CO_2	Carbon Dioxide	≥ configured alarm level 1 threshold	≤ 2% VOL
SO_2	Sulphur Dioxide	≥ configured alarm level 1 threshold	≤ 16ppm
CH_4	Methane	≥ configured alarm level 1 threshold	[ATEX] 2.2% VOL
			[UL] 2.5% VOL
C_4H_{10}	Butane	≥ configured alarm level 1 threshold	[ATEX] 0.7% VOL
			[UL] 0.6 % VOL
C_3H_8	Propane	≥ configured alarm level 1 threshold	[ATEX] 0.85% VOL
			[UL] 1.05% VOL
C_2H_2	Acetylene	≥ configured alarm level 1 threshold	[ATEX] 0.55% VOL
			[UL] 0.75% VOL
C_5H_{12}	Pentane	≥ configured alarm level 1 threshold	[ATEX] 1.15% VOL
			[UL] 1.2% VOL
C_2H_4	Ethylene	≥ configured alarm level 1 threshold	[ATEX] 1.15% VOL
			[UL] 1.35% VOL
NH_3	Ammonia	≥ configured alarm level 1 threshold	≤ 85ppm

Gas	Gas Name	Recommended Minimum Concentration	Recommended Maximum Concentration (see note)
$N0_2$	Nitrogen Dioxide	≥ configured alarm level 1 threshold	≤ 17ppm
NO	Nitric Oxide	≥ configured alarm level 1 threshold	≤ 85ppm
O_3	Ozone	≥ configured alarm level 1 threshold	≤ 0.7ppm (concentration from recommended generator)
CL_2	Chlorine	≥ configured alarm level 1 threshold	≤ 3ppm
CLO_2	Chlorine Dioxide	≥ configured alarm level 1 threshold	≤ 0.8ppm

Ensure the accuracy of the gas cylinder used does not allow the nominal gas concentration of the gas applied, to exceed the recommended maximum value.

2.8.2 Smart Bump Recommended Gas Levels

Table 2 shows the recommended minimum and maximum concentration of gas suitable for a Gas-Pro configured to undertake a smart bump test when inserted into a Q-Test.

Table 2

Gas	Gas Name	Recommended Minimum Concentration	Recommended Maximum Concentration (see note)
O_2	Oxygen	≥ configured alarm level 1 threshold	≤ 22% VOL
CO	Carbon Monoxide	≥ configured alarm level 1 threshold	≤ 400ppm
H_2S	Hydrogen Sulphide	≥ configured alarm level 1 threshold	≤ 85ppm
CO_2	Carbon Dioxide	≥ configured alarm level 1 threshold	≤ 2% VOL
SO_2	Sulphur Dioxide	≥ configured alarm level 1 threshold	≤ 16ppm
CH_4	Methane	≥ configured alarm level 1 threshold	[ATEX] 2.2% VOL [UL] 2.5% VOL
C_4H_{10}	Butane	≥ configured alarm level 1 threshold	[ATEX] 0.7% VOL [UL] 0.6% VOL
C_3H_8	Propane	≥ configured alarm level 1 threshold	[ATEX] 0.85% VOL [UL] 1.05% VOL

Gas	Gas Name	Recommended Minimum Concentration	Recommended Maximum Concentration (see note)
C_5H_{12}	Pentane	≥ configured alarm level 1 threshold	[ATEX] 0.55% VOL
			[UL] 0.75% VOL
C_2H_2	Acetylene	≥ configured alarm level 1 threshold	[ATEX] 1.15% VOL
			[UL] 1.2% VOL
C_2H_4	Ethylene	≥ configured alarm level 1 threshold	[ATEX] 1.15% VOL
			[UL] 1.35% VOL
NH_3	Ammonia	≥ configured alarm level 1 threshold	≤ 85ppm
$N0_2$	Nitrogen Dioxide	≥ configured alarm level 1 threshold	≤ 17ppm
NO	Nitric Oxide	≥ configured alarm level 1 threshold	≤ 85ppm
O_3	Ozone	≥ configured alarm level 1 threshold	≤ 0.7ppm (concentration from recommended generator)
CL_2	Chlorine	≥ configured alarm level 1 threshold	≤ 3ppm
CLO_2	Chlorine Dioxide	≥ configured alarm level 1 threshold	≤ 0.8ppm

Ensure the accuracy of the gas cylinder used does not allow the nominal gas concentration of the gas applied, to exceed the recommended maximum value.

Ensure the 'bump test plus/minus deviation' implemented for the smart bump test limit (as configured via Portables-Pro) does not allow the gas concentration to be applied, to exceed the recommended maximum value.

2.8.3 Calibration after bump fail Recommended Gas Levels

Table 3 shows the recommended minimum and maximum concentration of gas suitable for a Gas-Pro when configured to undertake a bump fail calibration, when the unit fails either a speedy or a smart bump.

Table 3

Gas	Gas Name	Recommended Minimum Concentration	Recommended Concentration	Recommended Maximum Concentration
O_2	Oxygen	≥ 18% VOL	18% VOL	≤ 22% VOL
CO	Carbon Monoxide	≥ 100ppm	250ppm (100ppm)	≤ 400ppm
H_2S	Hydrogen Sulphide	≥ 15ppm	25ppm (15ppm)	≤ 85ppm
CO_2	Carbon Dioxide	≥ 0.5% VOL	2% VOL (1%)	≤ 2% VOL
SO_2	Sulphur Dioxide	≥ 10ppm	10ppm	≤ 16ppm
CH_4	Methane	[ATEX] 2.2% VOL	[ATEX] 2.2 % VOL	[ATEX] ≤ 2.2% VOL
		[UL] 2.5% VOL	[UL] 2.5% VOL	[UL] ≤ 2.5% VOL
C_4H_{10}	Butane	[ATEX] 0.7% VOL	[ATEX] 0.7% VOL	[ATEX] ≤ 0.7% VOL
		[UL] 0.6% VOL	[UL] 0.6% VOL	[UL] ≤ 0.6% VOL
C_3H_8	Propane	[ATEX] 0.85% VOL	[ATEX] 0.85% VOL	[ATEX] ≤ 0.85% VOL
		[UL] 1.05% VOL	[UL] 1.05% VOL	[UL] ≤ 1.05% VOL
C_5H_{12}	Pentane	[ATEX] 0.55% VOL	[ATEX] 0.55% VOL	[ATEX] ≤ 0.55% VOL
		[UL] 0.75% VOL	[UL] 0.75% VOL	[UL] ≤ 0.75% VOL
C_2H_2	Acetylene	[ATEX] 1.15% VOL	[ATEX] 1.15% VOL	[ATEX] ≤ 1.15% VOL
		[UL] 1.2% VOL	[UL] 1.2% VOL	[UL] ≤ 1.2% VOL
C_2H_4	Ethylene	[ATEX] 1.15% VOL	[ATEX] 1.15% VOL	[ATEX] ≤ 1.15% VOL
		[UL] 1.35% VOL	[UL] 1.35% VOL	[UL] ≤ 1.35% VOL
NH_3	Ammonia	≥ 50ppm	50ppm	≤ 85ppm
$N0_2$	Nitrogen Dioxide	≥ 10ppm	10ppm	≤ 17ppm
NO	Nitric Oxide	≥ 50ppm	50ppm	≤ 85ppm

Gas	Gas Name	Recommended Minimum Concentration	Recommended Concentration	Recommended Maximum Concentration
O_3	Ozone	0.7ppm (concentration from recommended generator)	0.7ppm (concentration from recommended generator)	≤ 0.7ppm (concentration from recommended generator)
CL_2	Chlorine	≤ 1ppm	2.5ppm	≤ 3ppm
CLO_2	Chlorine Dioxide	≤ 0.5ppm	0.5ppm	≤ 0.8ppm

For a bump fail calibration certified gas to ±2% accuracy is recommended.

Ensure the accuracy of the gas cylinder used does not allow the nominal gas concentration of the gas applied, to exceed the recommended maximum value.

3. Service and maintenance

3.1 General

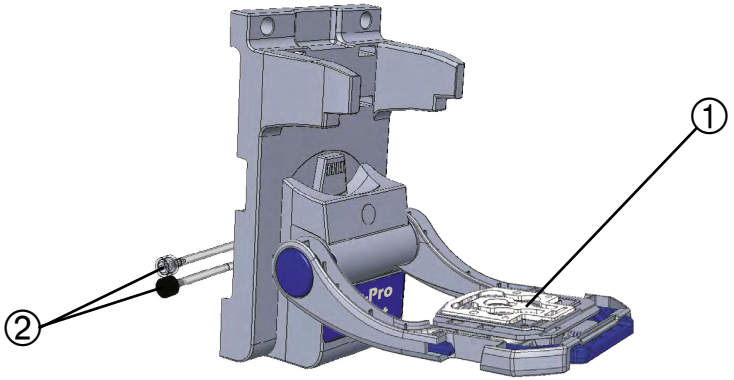
Ensure maintenance and service are carried out in accordance with the procedures in the manual and only by trained personnel.

Q-Test is designed to require minimal service and maintenance. Use only genuine Crowcon replacement parts.

3.2 Periodic checks

Periodically check for any signs of physical damage, paying special attention to the flow gasket ① and the gas inlet & exhaust pipes ②.

Figure 12: Periodic checks



4. Specification

Table 4

Q-Test	
Size (d x l x w)	88 x 221 x 116mm (3.46 x 8.70 x 4.57 inches)
Weight	340g
DIN rail	35mm x 75mm top hat rail (EN 50022, BS 5584, DIN 46277-3) With Cylinder holder recommended length of DIN is 250mm
Gas inlet/exhaust tube diameter	3mm inside diameter, 5mm outside diameter
Powered Q-Test	
Size (d x l x w)	88 x 240 x 185mm (3.46 x 9.45 x 7.29 inches)
Weight	762g
DIN rail	35mm x 275mm top hat rail (EN 50022, BS 5584, DIN 46277-3) With Cylinder holder recommended length of DIN is 300mm
Gas inlet/exhaust tube diameter	3mm inside diameter, 5mm outside diameter

5. Accessories

Table 5

Part Number	Description
REG001	0.5l/min fixed flow regulator with on/off switch
REG002	0.5l/m fixed flow trigger regulator
REG003	0.5l/min fixed flow reactive gas regulator with on/off switch
AC0510	Cylinder Holder (wall mount) for 34l to 110l cylinders
AC0611	Replacement flow gasket
AC0612	Inlet tube connector
AC0613	Exhaust tube connector
CH0106	Vehicle charging adaptor
CH0101	Multiregion power supply
AC0201	1M Standard tubing (includes tube insert)
AC0203	3M Standard tubing (includes tube insert)
AC0205	5M Standard tubing (includes tube insert)
AC0210	10M Standard tubing (includes tube insert)
AC0220	20M Standard tubing (includes tube insert)
AC0230	30M Standard tubing (includes tube insert)
AC0301	1m reactive gas tubing (Tygothane® 3.2mm ID including tube insert)
AC0303	3m reactive gas tubing (Tygothane® 3.2mm ID including tube insert)
AC0614	35mm x 275mm DIN rail

For gas cylinder information please contact Crowcon or your local agent.

6. Troubleshooting

Table 6

Symptom	Action
Gas-Pro does not go into bump mode	Ensure the Gas-Pro is on and configured to bump test. Ensure the gas is correct for the Gas-Pro type presented. Ensure the gas is manually turned on for the duration of the test. Check the gasket for any signs of damage or wear and tear. Ensure the door is fully closed.
Gas-Pro does not pass the bump test	If the Gas-Pro still fails it is very likely that the Gas-Pro requires calibration.
Gas-Pro does not charge (Powered Q-Test only)	Check power supply is turned on and connected. Check that charging contacts are not damaged and are clean

Warranty

This equipment leaves our factory fully tested and calibrated. If within the warranty period of two years from despatch, the equipment is proved to be defective by reason of faulty workmanship or material, we undertake at our option either to repair or replace it free of charge, subject to the conditions below.

Flow gasket

The flow gasket is expected to last 15,000 bumps in ambient conditions.

Warranty Procedure

To facilitate efficient processing of any claim, contact your local Crowcon agent/distributor, a Crowcon regional office or our global customer support team (English working language) on +44 (0)1235 557711 or customersupport@crowcon.com to obtain a returns form for identification and traceability purposes. This form may be downloaded from our website 'crowconsupport.com' and requires the following information:

- Your company name, contact name, phone number and email address.
- Description and quantity of goods being returned, including any accessories.
- Instrument serial number(s).
- Reason for return.

Gas-Pro will not be accepted for warranty without a Crowcon Returns Number (CRN). It is essential that the address label is securely attached to the outer packaging of the returned goods.

The guarantee will be rendered invalid if the instrument is found to have been altered, modified, dismantled, tampered with, or has not used Crowcon spares for replacement parts or has been serviced or repaired by any party not authorised and certified by Crowcon to do so. The warranty does not cover misuse or abuse of the unit including use outside of specified limits.

Warranty Disclaimer

Crowcon accept no liability for consequential or indirect loss or damage howsoever arising (including any loss or damage arising out of the use of the instrument) and all liability in respect of any third party is expressly excluded.

This warranty does not cover the accuracy of the calibration of the unit or the cosmetic finish of the product. The unit must be maintained in accordance with the instructions in this manual.

The warranty on replacement consumable items supplied under warranty to replace faulty items, will be limited to the unexpired warranty of the original supplied item.

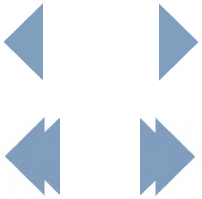
Our liability in respect of defective equipment shall be limited to the obligations set out in the guarantee and any extended warranty, condition or statement, express or implied statutory or otherwise as to the merchantable quality of our equipment or its fitness for any particular purpose is excluded except as prohibited by statute. This guarantee shall not affect a customer's statutory rights.

Crowcon reserves the right to apply a handling and carriage charge whereby units returned as faulty, are found to require only normal calibration or servicing, which the customer then declines to proceed with.

For warranty and technical support enquiries please contact:

Customer Support

THORNE & DERRICK INTERNATIONAL
www.thorneandderrick.com



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